

100% HYDROGEN ICE CONVERSION PICKUP TRUCK DEVELOPMENT

ETEC and Roush Industries are working to develop 100% hydrogen internal combustion engine (HICE) pickup trucks. Hydrogen ICE vehicles yield cleaner vehicles now and provide an introduction to the use of hydrogen fuel by supporting the development of hydrogen infrastructure technology.

Vehicle Specifications

- Base vehicle is a Chevrolet 1500HD equipped with a 4-door cab and room for six people
- Hydrogen engine based on 6.0 liter GM V8 with electronic port fuel injection and a supercharger/intercooler system optimized to achieve sufficient power and torque
- 180 Horsepower and 260 lb-ft torque,
- 4-Speed automatic transmission,
- 10.5 kg of hydrogen fuel stored onboard at a pressure of 350 bar (5,000 psi), in three 150-liter aluminum lined, carbon-fiber reinforced tanks
- Driving range exceeds 250 km (155 miles)
- HICE conversion will yield significant reductions in vehicle emissions compared to the gasoline-powered base engine
- HC < 10 ppm, NOx < 25 ppm steady-state on engine dyno; feedgas = tailpipe as no catalysts are used

HICE Engine Modifications

- Integration of Lysholm supercharger to intake manifold
- Integration of large liquid-to-air intercooler
- Integration of OEM fly-by-wire throttle body
- Selection of spark plugs for operation in hydrogen combustion environment

HICE Engine Control Hardware and Software Integration Efforts

- Complete removal of OEM powertrain control module (PCM)
- Selection and integration of appropriate aftermarket PCM
- Development of engine control strategies for hydrogen lean-burn operation
- Development of matching transmission control strategies
- Implementation of J1850 communications to maintain seamless integration with existing OEM vehicle equipment

CARB and EPA Emissions Certification Process

- Emissions development at Argonne National Labs' 4-wheel chassis dyno with dilution air scrubbing capability
- Targeted to meet NOx requirements for 2007 Tier II, Bin 7 standards

Production Status

- Nine conversion vehicles are currently in production
- One vehicle will participate in the Department of Energy's Advance Vehicle Testing Activity (HICEV America test program)
- Eight vehicles were purchased by Powertech Labs to support the Industrial Waste Hydrogen Utilization Project (IWHUP) in British Columbia, Canada
- IWHUP will use recovered waste hydrogen to supply a network of refueling stations serving British Columbia's Hydrogen Highway. Local businesses will lease the HICE trucks from Powertech Labs and operate them for a two year period
- Additional vehicles will be produced on demand



AVTA Web Site: <http://avt.inl.gov>

• Contact
Jim Francfort
Idaho National Laboratory
e-mail: James.Francfort@inl.gov